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Patent

Docket No.: HM-361PCT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Günter Kneppe, et al.

Serial No: 09/673,327

U.S. Filed: March 12, 2001

For: ROLL STAND WITH AXIALLY DISPLACEABLE ROLLS

Examiner: Lowell A. Larson

Art Unit: 3725

Mail Stop Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**SUBMISSION OF CORRECTED BRIEF ON APPEAL**

SIR:

Submitted herewith is a Corrected Brief On Appeal in support of the appeal filed November 30, 2004.

A check in the amount of $ 340.00 was previously submitted to cover the appeal fee pursuant to 37 CFR §1.17 (f).

Any additional fees or charges required at this time in connection with the application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

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Dated: April 12, 2006

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on April 12, 2006.

By: _____ Date: April 12, 2006
Friedrich Kueffner

Patent

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**CORRECTED BRIEF ON APPEAL**

S I R:

This appeal is taken from the Final Action mailed October 8, 2004.

## Real Party in Interest

The real party in interest in the above-identified application is:

SMS Schloemann-Siemag Aktiengesellschaft
Eduard-Schloemann-Strasse 4
DE-40237 Düsseldorf
Germany

## Related Appeals and Interferences

There are no related appeals or interferences of which Applicants are aware regarding the above-identified application.

## Status of Claims

Claims 10 and 12-15 are pending in the application. Claims 1-9 and 11 have been canceled. Claims 10 and 12-15 are subject to the present appeal. Claims 10 and 12-15 stand rejected under 35 U.S.C. 103(a) over U.S. Patent No. 3,822,081 to Mercer et al. in view of U.S. Patent No. 4,191,042 to Salter, Jr. and U.S. Patent No.

2,075,574 to Dahlstrom.

## Status of Amendments After Final Rejection

No amendment after Final Rejection was filed.

## Summary of the Claimed Subject Matter

The claimed invention recites a roll stand for hot-rolling or cold-rolling rolled strips of different materials, the roll stand comprising work rolls, back-up rolls and, optionally, intermediate rolls arranged in pairs, wherein the rolls of at least one pair of rolls are axially displaceable under load toward both sides and have a contour suitable for compensating rolling defects (see page 1, lines 3-8 of the specification). Each displaceable roll has at least one hydrodynamic oil film bearing with a bearing shell (see page 3, lines 2-3 and page 6, lines 3-5). A hydraulic unit for effecting the axial displacement is integrated into the hydrodynamic oil film bearing (see page 3, lines 3-5) such that the hydraulic unit is adapted to the shape of the hydrodynamic oil film bearing and a diameter of the hydraulic unit is greater than a diameter of the bearing shell of the hydrodynamic oil film bearing (see page 4, line 19- page 5, line 3). The hydraulic unit has an

annular cylinder 7 connected to the roll stand, wherein an annular piston 8 with an integrated ring 10 connected to the roll through conical roller bearings 9 is sealingly guided in the annular cylinder 7 (see page 4, lines 16-19 and page 6, lines 10-15). The annular piston has on a circumference thereof a ring 10 (see page 5, lines 4-6) which is axially displaceable with the annular piston 8 in a groove 11 of the annular cylinder 7 (see page 6, lines 10-15), wherein the groove 11 forms together with the annular piston 8 an annular space 12 which is divided by the ring 10 into annular space portions, wherein the annular space portions are in connection with a control hydraulic system of the roll stand through separate hydraulic connections 13 (see page 6, lines 16-19), so that pressure can be applied to both sides of the ring 10 of the annular piston 8. A position indicator 15 is provided for each displaceable roll, which position indicator is connected with the free end of a roll neck 5 of the roll to determine axial position (see page 5, lines 9-13 and page 6, line 20 to page 7, line 4). The foregoing is recited in independent claim 10.

## Grounds of Rejection to be Reviewed on Appeal

The following issue is presented for review:

Whether claims 10 and 12-15 are unpatentable under 35 U.S.C. 103(a) over Mercer et al. in view of Salter, Jr. and Dahlstrom.

## Argument

### The Rejection of Claims 10 and 12-15 under 35 U.S.C. 103(a) over Mercer et al. in view of Salter, Jr. and Dahlstrom:

In rejecting claims 10 and 12-15, the Examiner stated the following when rejecting the claims as being unpatentable over Mercer et al. in view of Salter, Jr. and Dahlstrom:

"Mercer et al. discloses a rolling mill roll having bearing means with an integrated hydraulic unit for effecting axial adjustment of the roll in the manner required by these claims. Bushing 14 provides a bearing surface 16 for axial adjustable roll sleeve 18.

Salter, Jr. discloses an axially adjustable rolling mill roll bearing assembly in which bushing 16 provides a bearing surface 14 for roll sleeve 12, and advises that it is preferable to maintain an oil film at surface 14 between the bushing 16 and

sleeve 12.

It would have been obvious to one skilled in the art at the time the invention was made to provide an oil film at the surface 16 between the bushing 14 and sleeve 18 in Mercer et al. in a conventional manner, following the suggestion of Salter, Jr., in order to reduce frictional loads as much as possible during axial adjustments.

It is noted that Mercer et al. suggests that both rolls of a roll pair can be axially adjustable. To provide the Mercer et al. integral hydraulic unit bearing assembly, modified with oil film means as suggested by Salter, Jr., for all of the axially adjustable rolls is considered to be an obvious mechanical expedient to one skilled in the art merely as a duplication of parts. Additionally, to provide intermediate and/or backup rolls in a conventional manner in a stand having the bearing assemblies of Mercer et al., modified as suggested by Salter, Jr., is an obvious exercise of mechanical design to one skilled in the art, and not a patentable distinction absent a disclosure of criticality in the solution of stated problems in any particular combination of roll arrangement and adjustment means.

Mercer, et al. advises that the integral hydraulic unit bearing assemblies permit axial adjustments of the rolls to be made "while the mill is in operation". See column 3, lines 32-35 of Mercer et al. One skilled in the art would understand that while the mill is in operation is the same as "under load", as required by the claims.

The claims require the roll position indicator to be connected with the free end of a roll neck of a displaceable roll. Dahlstrom shows a rolling mill arrangement in which the axial position of working rolls is determined by sensing the actual position of the free end of the roll necks. See Figure 8.

It would have been obvious to one of ordinary skill in the art to positon the axial position sensor 84 of Mercer to directly contact the free end of roll neck 26, following the suggestion of Dahlstrom, in order to determine the exact positon of the roll relative to the stand structure regardless of possible play in the roll bearings.

Dahlstrom clearly detects axial movement of the rolls 17, 18 by means 32, 33, 34 (Figure 8) directly coupled to the ends of the rolls. See page 3, column 2, lines 42 to 51, and page 4,

column 1, lines 5 to 13 and 24 to 27. The fact that Dahlstrom utilizes the detected axial position of the roll ends to effect an adjustment of the roller support bearings in a plane parallel to the rolling direction is not considered to be significant in the grounds of rejection of record in this application. Instead, Dahlstrom is considered to suggest to one skilled in the art that is desirable to detect the axial position of the working rolls by instrumentation located directly at the ends of the rolls rather than measuring the position of another element associated with the rolls, such as the supporting bearings. It follows from such a suggestion that one skilled in the art would be motivated to locate the axial measurement transducer 84 of Mercer in direct contact with the end of the roll, rather than in contact with the bearing housing element 54 as seen in the Mercer drawing, in order, as stated in the grounds of rejection, to avoid measurement errors which might arise from machine tolerances or play present in the assembly of the bearing and roll."

The patent to Mercer et al., discloses an axial roll adjustment means. In Mercer et al. the position indicator 84 is connected to a part of the bearing. Therefore, Mercer et al. can only provide an indirect determination of position. An accurate determination of the axial displacement of the roll or rolls is not possible because bearing play is not taken into consideration by the displacement indicator of Mercer et al, which in turn leads to an incorrect setting of the roll.

The patent to Salter, Jr. discloses a heavy duty axial adjustment mechanism for rolling mill rolls.

The patent to Dahlstrom discloses alignment maintenance for

the rolls of rolling mills.

The Examiner cites Figure 8 of the patent to Dahlstrom as showing a rolling mill arrangement in which the axial position of working rolls is determined by sensing the actual position of the free end of the roll necks.

Applicant respectfully submits that the combination of references does not teach the presently claimed invention. The presently claimed invention covers a roll stand for hot-rolling or cold-rolling rolled strips of different materials with work rolls, back-up rolls and, optionally, intermediate rolls arranged in pairs, wherein the rolls of at least one pair of rolls are axially displaceable toward both sides and have a contour for compensating rolling defects. The object of the present invention is to simplify the axial displacement of the rolls of a roll stand relative to the approach using displaceable chocks.

The present invention thus deals with axially displaceable rolls. This is not taught by Dahlstrom. Dahlstrom addresses the problem that the axes of the work rolls, which are normally parallel to each other, over time, change their position and cross (see page 1, column 1, beginning at line 12 of Dahlstrom). In other

words, Dahlstrom deals with moving the roll axes in a horizontal plane so that the axes stay parallel above one another. The roll axes are **not** axially moved.

The arrangement shown in Fig. 8 of Dahlstrom adjusts the position of the bearing 28 in or opposite to the running direction of the rolled material, **not** in the axial direction. With this arrangement the roll axes are brought into a position perpendicular to the running direction of the rolled material. This takes place via the gears 30 driven by a motor 31. The gears 30 adjust the screws 29 that are horizontally arranged in the stand 21 and connected to the bearing 28. When the screw 29 is turned the bearing 28 and the roll axis are moved relative to the running direction of the rolling material. As shown in the bottom left in Fig. 8, the roll axis is influenced from the side. An axial displacement cannot be carried out by this arrangement.

Furthermore, Fig. 8 does not show a position indicator as in the presently claimed invention. According to the present invention, a position indicator is provided that is connected with the free end of the roll neck of the roll. This allows a determination of the axial position of the free end and therewith the roll contour. A turning of the roll axis in a horizontal plane

is not carried out by the present invention.

Fig. 8 of Dahlstrom teaches just such an arrangement. As shown, the slide contact 32 is arranged on the right and left sides of the contact positions 33, 34. The roll axle is arranged in a horizontal plane. If the right angle between the running direction of the rolling material and the roll axis changes in an amount that is disruptive to rolling the outer surfaces of the contact 32 move in the contact positions 33, 34. The contact occurs as follows, the contact 32 contacts the right upper position 34 and the left lower position 33, or the left upper position 33 and the right lower position 34. By this contact the electric circuit is closed and the motor 32 is actuated which moves the screw 29 in or out. The screw 29 changes the horizontal position of the roll ends or the bearing 28. There is no axial movement of the roll axis and such a movement is not even possible since the screw 29 is perpendicular to the roll axis.

Thus, the present invention provides a direct measurement or determination of the axial position of the roll. None of the references taken either alone or in combination proved any teaching of the invention as discussed above and as recited in independent claim 10.

## Conclusion

Accordingly, in view of the above considerations, it is Applicant's position that the Examiner's rejection of claims 10 and 12-15 under 35 U.S.C. 103(a) over Mercer et al. in view of Salter, Jr. and Dahlstrom is in error and should be reversed.

A check in the amount of $340.00 to cover the fee for filing an appeal brief was previously submitted. Any additional fees or charges required at this time in connection with this application should be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

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Dated: April 12, 2006

**CERTIFICATE OF MAILING**

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By: 
Friedrich Kueffner

Date: April 12, 2006

## Claims Appendix

10. A roll stand for hot-rolling or cold-rolling rolled strips of different materials, the roll stand comprising work rolls, back-up rolls and, optionally, intermediate rolls arranged in pairs, wherein the rolls of at least one pair of rolls are axially displaceable under load toward both sides and have a contour suitable for compensating rolling defects, wherein

a) each displaceable roll has at least one hydrodynamic oil film bearing with a bearing shell, wherein a hydraulic unit for effecting the axial displacement is integrated into the hydrodynamic oil film bearing such that the hydraulic unit is adapted to the shape of the hydrodynamic oil film bearing and a diameter of the hydraulic unit is greater than a diameter of the bearing shell of the hydrodynamic oil film bearing;

b) the hydraulic unit has an annular cylinder connected to the roll stand, wherein an annular piston with an integrated ring connected to the roll through conical roller bearings is sealingly guided in the annular cylinder;

c) the annular piston has on a circumference thereof a ring which is axially displaceable with the annular piston in a groove of the annular cylinder, wherein the groove forms together with the

annular piston an annular space which is divided by the ring into annular space portions, wherein the annular space portions are in connection with a control hydraulic system of the roll stand through separate hydraulic connections, so that pressure can be applied to both sides of the ring of the annular piston; and

d) a position indicator is provided for each displaceable roll, which position indicator is connected with the free end of a roll neck of the roll to determine axial position.

12. The roll stand according to claim 10, wherein an axial position of the displaceable rolls is controllable by the hydraulic unit through a control circuit of the roll stand by using signals of the position indicator.

13. The roll stand according to claim 10, wherein the hydrodynamic oil film bearing with the hydraulic unit is configured to be usable as a retrofitting part.

14. The roll stand according to claim 10, wherein the hydrodynamic oil film bearing with the hydraulic unit is configured to be mountable in front stands and/or rear stands of hot rolling mills and/or cold rolling mills.

15. The roll stand according to claim 10, wherein the position indicator is connected with the free end of the roll neck of the roll by a connecting rod.

## Evidence Appendix

N.A.

## Related Proceedings Appendix

There are no related proceedings.